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ABSTRACT

Operation Waste Watch is a series of seven sequential learning units which addresses the subject of litter control and solid waste management. Each unit may be used in a variety of ways, depending on the needs and schedules of individual schools, and may be incorporated into various social studies, science, language arts, health, mathematics, and artistic activities. Each unit consists of a teacher's guide, filmstrip-cassette set, activity cards, test materials, duplicating masters, and a poster. This document contains the teacher's guide and activity cards for the sixth-grade unit entitled "Community Solutions for Solid Waste Pollution." In this unit, students study their own locality's solid waste problems and design a model waste disposal plan for an imaginary community. Seventeen individual- and 12 class-activity cards are included. (CW)

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Operation Waste Watch

Community Solutions for Solid Waste Pollution

Level 6

Teacher Guide

Department of Waste Management
Division of Litter Control & Recycling
Eleventh Floor Monroe Building
Richmond, Virginia 23219

SE051655

INTRODUCTION

OPERATION WASTE WATCH is a series of 7 sequential learning units which addresses the subjects of litter control and solid waste management. The curriculum, developed by the Division of Litter Control, Virginia's state litter prevention agency, is designed for classroom use in kindergarten through grade six.

Each OPERATION WASTE WATCH unit may be used in a variety of ways, depending on the needs and schedules of individual students and schools. Each unit is interdisciplinary in approach and may be incorporated into the various science, social studies, and health curricula Virginia teachers are presently using. Language arts, mathematics, and artistic activities are also highlighted. Each unit consists of a teacher's guide, filmstrip-cassette set, activity cards for class and individual student use, test materials, coloring book duplicating masters or comic books, and a colorful poster. Each elementary school in Virginia may receive a complete set of OPERATION WASTE WATCH without cost.

Flexibility is a key element of the OPERATION WASTE WATCH program. The sequence of the units within the curriculum may be changed to suit the abilities of students in the individual school. For this reason, teachers should become familiar with each of the units. Each instructor should also feel free to present concepts found in previous units. This is especially important for upper elementary students who are unfamiliar with the solid waste vocabulary and ideas presented in earlier units. The materials in each unit are color-coded for easy identification.

The teacher is free to shorten or lengthen the series of activity cards which are the heart of the unit, to suit her/his schedule or to build her/his own unit around the OPERATION WASTE WATCH auxiliary materials.

OPERATION WASTE WATCH is based on WASTE IN PLACE, the elementary school curriculum recently created by Keep America Beautiful. Solid waste management has become a very important environmental topic, but it is a subject which is too often superficially addressed in elementary textbooks.

WASTE IN PLACE was the first sequential elementary curriculum in the United States to address the concepts of proper waste handling. WASTE IN PLACE is available at cost to all localities around the country organized under the Clean Community System of Keep America Beautiful and to other interested groups. In developing OPERATION WASTE WATCH for Virginia's elementary schools, the Division of Litter Control changed the format of WASTE IN PLACE and designed supplementary activities and materials, including audiovisual aids.

OPERATION WASTE WATCH differs significantly from WASTE IN PLACE in its approach to the subject matter only in Levels 2 and 3. The Division believes that the ideas presented in these 2 units merit special emphasis in a study of solid waste problems in Virginia. Level 2, LITTER POLLUTION, addresses pollution problems associated with litter, while Level 3, TRASH TRENDS, examines packaging trends in relationship to current solid waste problems.

Field Testing

Two versions of OPERATION WASTE WATCH were piloted during the 1979-1980 school year in over 125 classrooms in 14 school systems with very positive results. A summary of the results of this field testing is available from the Division. Based on the results of the piloting, portions of the draft curriculum were revised in the fall of 1980.

Changing Littering Behavior

In addition to equipping students with important facts about litter and solid waste management, OPERATION WASTE WATCH is designed to help students modify their everyday waste disposal habits.

A study of students' waste disposal behavior was conducted in the spring of 1980 by two psychologists from Virginia Polytechnic Institute and State University, Mr. John Cope and Dr. Scott Geller. Their study confirmed that students learn from involvement with OPERATION WASTE WATCH. Student test performance following the curriculum was statistically higher than performance on the pretest. (Grades 1, 4 and 6 were the levels involved in the study.) Almost all of the teachers indicated that the OWW program materials were interesting to the students.

Most of the teachers felt that their students' littering be-

havior had decreased as a direct result of the program. The Division of Litter Control encourages teachers to emphasize recycling and the proper disposal of wastes. With continued positive reinforcement of proper behavior, and practice by the children of proper disposal techniques, teachers will see an even greater reduction in littering behavior.

The Virginia Plan: A Model Program to Prevent Littering

The DIVISION OF LITTER CONTROL was established in 1977 to control, prevent, and eliminate litter from the state to the maximum practical extent.

One-half of Division funds are granted annually to the localities of the state to finance local litter prevention programs. Over 90% of the counties and cities annually apply for and receive grant money from the Division. To assist these localities in organizing effective, comprehensive, long-range litter control programs, the Division has developed an organizational package, THE VIRGINIA PLAN: A MODEL PROGRAM TO PREVENT LITTERING, which is available to all community leaders interested in developing local programs. OPERATION WASTE WATCH is one component of THE VIRGINIA PLAN.

The Division is encouraging local litter prevention coordinators to work closely with schools in each locality. Many localities are promoting the implementation of OPERATION WASTE WATCH in their schools.

CONTACT THE DIVISION OF LITTER CONTROL FOR THE NAME AND PHONE NUMBER OF THE LITTER CONTROL COORDINATOR IN YOUR LOCALITY.

OPERATION WASTE WATCH UNIT TOPICS

Level K

Natural and Man-Made Objects

Students practice classification skills and learn to differentiate between natural and man-made objects in indoor and outdoor environments. They also learn to identify litter.

Level 1

Waste Out of Place

Students classify objects into two categories, "waste objects" and "useful objects." In addition, they learn to identify litter and dispose of their own waste items properly.

Level 2

Litter Pollution

Students study the negative effects of littering: injury to humans and animals, environmental pollution, and wasted resources. In addition, they explore a littered area, study the characteristics of litter, and learn how to clean it up.

Level 3

Trash Trends

Students trace historical changes in consumption and packaging. They also study the roles of packaging in everyday life and learn the meaning of "biodegradable."

Level 4

Let's Waste Less Waste

Students examine changes which can be made in their homes to reduce solid waste and litter. They also explore various sources of litter in their communities.

Level 5

Trash Treasures

Students discover that while many things are recycled by nature, quite a number of modern products must be recycled by people. They learn that recycling and resource recovery can help save important resources which are often lost when items are tossed into a trash receptacle.

Level 6

Community Solutions for Solid Waste Pollution

Students study their own locality's solid waste problems and design a model waste disposal plan for an imaginary community.

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LEVEL 6

RATIONALE

This series of instructional materials, developed by the Division of Litter Control, is designed to help elementary students deal effectively with solid waste problems encountered in their everyday lives. It will also prepare them to deal as adults with the growing problem of waste disposal facing each community. In Virginia, litter pickup alone is estimated to cost $25 million annually.

Litter is a very accessible pollutant and one young students can comprehend. Children may be able to do very little to solve other environmental problems; but they can learn to dispose of waste properly, help recycle some items, and come to understand how their own behavior affects the environment. A solid waste management unit is an excellent place to begin creating environmental awareness. From this point we can begin building in our youth a strong sense of environmental stewardship and pride.

Sixth grade students can begin to appreciate the complexities of solid waste management, and the fact that individual habits and community-wide attitudes and norms must be changed if we are to see improvement in municipal waste management systems.

The Level 6 unit of OPERATION WASTE WATCH requires the students to study their own community's waste disposal system and identify problems in this system. In a simulation game, the students will apply the knowledge they gain to make decisions concerning solid waste management for a hypothetical community, GLEN CITY.

If your students have not studied earlier units of OPERATION WASTE WATCH, feel free to borrow ideas, activities, and filmstrips from the previous kits to prepare your students for the Level 6 ideas.

MAJOR IDEAS OF THE LEVEL 6 UNIT

1. Solid waste management is a very important issue in all communities.
2. Because of the complexity of the issues, decisions regarding solid waste management are often difficult to make.

3. There are several things individuals and communities can do to improve solid waste management.
4. Citizens need to learn about waste management problems, and some disposal methods and habits must be changed.
5. In many communities, local laws need improvement before litter and solid waste problems can be adequately managed.
6. Landfills must be managed properly to avoid water pollution and other problems.

UNIT OBJECTIVES

By the end of the unit, the student will be able to:

1. RECOGNIZE that each American throws away a large amount of waste each day;
2. IDENTIFY several solid waste problems in his/her community;
3. WORK WITH CLASSMATES TO DESIGN an improved solid waste management plan which is educational, workable, and affordable;
4. DEFINE common terms associated with solid waste management;
5. RECYCLE OR REUSE a few waste objects.

ELEMENTARY SCIENCE PROGRAM OBJECTIVES

The following program objectives are emphasized in grade 6 science curricula and incorporated into this unit (see reference 5, pg. 8):

1. Observing—The student will use all senses in the identification of objects and their properties, controlled observations, and ordering of a series of observations.
2. Collecting and Organizing Data—The student will collect and organize information pertaining to a problem, communicate it verbally or graphically, and present these data in such a way that trends can be analyzed.
3. Inferring—The student will make inferences, suggesting explanations, reasons, or causes for events which have occurred.
4. Hypothesizing—The student will identify a question or problem that can be tested.

INSTRUCTIONAL STRATEGY

1. Review this guide and study all unit components thoroughly. Also become familiar with the other OPERATION WASTE WATCH units.

2. Decide which elements of the unit kit and which activity cards you will use. Add your own ideas as necessary or pull activities from OPERATION WASTE WATCH UNITS on other grade levels.
3. Prepare all necessary materials and arrange for any outside speakers or field trips.
4. **Be sure to find out what your community is doing to fight the littering problem. Contact the Division of Litter Control or your local government.**
5. Administer the pretest to your students. Use the results to modify your unit plans as necessary.
6. Briefly discuss the topic and title of the unit with your class. Tell the students about some of the activities they will be involved in.
7. Explain the contents of the unit kit to your students.
8. Hang the poster in a prominent spot in your classroom.
9. Present the filmstrip to the class. During the showing, stop the filmstrip to allow for discussion of important ideas.
10. Proceed with the INDIVIDUAL AND CLASS ACTIVITY CARDS.
11. Present the comic books at some appropriate point in the unit. Use these as a motivational and teaching tool.
12. At the completion of the unit, present the filmstrip once again as a review activity. Elicit discussion of ideas the students have learned.
13. Administer the posttest to your students.
14. Return all unit components to the box for use by the next class.
15. **Be sure to review and reinforce proper waste disposal habits throughout the school year!**

TIME FRAME

The complete Level 6 unit will take approximately 6-8 weeks (30 or more forty-five minute learning sessions).

If you want to shorten the unit to 3 or 4 weeks, we recommend that you use only the CORE ACTIVITY CARDS of the **INDIVIDUAL ACTIVITY CARDS.** Each core card is labeled CORE in the upper left-hand corner. You may also shorten the unit by modifying the **CLASS ACTIVITY CARD** simulation game. Another method is to use the activity cards and other materials as guidelines for developing your own shortened unit.

Allow approximately 30 minutes for administering the tests at the beginning and end of the unit. Each filmstrip showing should take about 15 minutes.

EVALUATION INSTRUMENTS

Included in this unit are duplicating masters for the student test. Administer the test to your class just before beginning the unit. This test should be used as a screening device to identify students who will need special help. You may need to develop additional activities for these students.

Administer the test once again, immediately after the class completes the unit. Posttest results will show whether or not your students attained the unit objectives. Comparison of the pretest and posttest results for each student can help you determine the effectiveness of your unit.

FILMSTRIP AND CASSETTE

The filmstrip and cassette set provided with this unit is designed for use as both an introductory and review activity.

This guide contains a copy of the filmstrip script with asterisks (*) indicating spots in the program where we encourage you to stop the cassette and filmstrip to allow for class discussion. The cassette has audible tones and should be used with a manually-operated filmstrip projector. **The filmstrip is brief and is to be used as a teaching tool. During the showing, please encourage group discussion of the ideas presented.**

Before using the ACTIVITY CARDS, present the filmstrip to the class as an introduction to the unit. This may be done in small groups or as a total class activity. Present the filmstrip again at the end of the unit as a review of major ideas. The script may be read aloud if for any reason a cassette recorder is not available or if this delivery method is preferred.

When the filmstrip is used as a review activity, it may be most helpful to read the script rather than use the cassette tape. Proceeding at a comfortable speed, ask the students to respond orally to the questions raised.

INDIVIDUAL ACTIVITY CARDS (IACs)

The 17 IACs are designed for use by small groups or individual students. However, they may be used as total class activities if this method is preferred. Most of the IACs need not be used in the order in which they are numbered. Throughout the unit, make a point of discussing the various IAC activities with the whole class.

You are encouraged to restructure, modify, delete, and create additional IAC activities as necessary. IACs which provide more advanced activities are marked with asterisks (*).

THE IAC ACTIVITIES SHOULD BE COMPLETED BEFORE THE CLASS ACTIVITY CARDS (CACs) ARE INTRODUCED. However, the **MINI-LANDFILL** activity (IACs 13/17 through 17/17) will require some time spent during the CAC portion of the unit.

CLASS ACTIVITY CARDS (CACs)

Used in numerical order, the 12 CACs provide the teacher with a sequential set of instructional activities. The CACs are designed as a class activity which will involve 4 student committees. For the Level 6 unit, they are the foundation of a simulation game concerning an imaginary community, Glen City. This game will help develop the students' decision-making skills.

COMIC BOOKS

In the kit box you will find 25 copies of the comic book entitled, Where's My Science Report? Before teaching the unit, read the comic yourself. You may decide to design study questions based on the story to gauge your students' vocabulary and comprehension skills.

At some point while you are teaching the unit, pass out the books to your students. Allow the class to read the story out loud. Discuss the theme of the comic book as a class or in small groups.

If you have extra time, you may decide to have your students act out a skit based on the story. Perhaps they could present their skit to another class, or the students could exercise their own creativity by writing and illustrating their own litter prevention comics to take home to their families.

Be sure to return the comic books to the unit box so the next class can use them.

ECOLOGY CLUB PROGRAM

Since the fall of 1978, the Division of Litter Control has sponsored a successful ECOLOGY CLUB PROGRAM for grades 6-12. Many clubs have been formed around the state. A brochure in this kit describes the **free** membership materials and resources available to Ecology Club members. To obtain these materials for your students, simply duplicate the order form provided in the brochure and return the completed form to the Division. **Return the Ecology Club Brochure** to the unit box.

COMING IN THE FUTURE

A major advantage of the activity card format used in OPERATION WASTE WATCH is that additional cards may be added and revisions made at minimal expense to the Division.

The Division will continue to evaluate the program throughout the coming years. As a result of this evaluation, new and revised ACTIVITY CARDS will be developed periodically and sent to your school.

ORDERING REPLACEMENT MATERIALS FOR THIS UNIT

Replacement copies of the filmstrip, cassette, poster, teacher's guide, activity cards, and coloring/comic books for this unit may be obtained without charge from the Division of Litter Control.

DUPLICATING MASTERS

This unit contains the duplicating masters listed below. Photocopy these materials as necessary:

1. PRETEST AND POSTTEST
2. VOCABULARY WORKSHEET
3. GLEN CITY INFORMATION SHEET
4. MAP OF GLEN CITY
5. LEGAL COMMITTEE RESPONSIBILITIES
6. EQUIPMENT COMMITTEE RESPONSIBILITIES
7. DISPOSAL METHODS COMMITTEE RESPONSIBILITIES
8. TEMPORARY LANDFILL SITING COMMITTEE RESPONSIBILITIES

VOCABULARY

The following is a list of terms of major significance in this unit. The function of this list is, first of all, to provide a **glossary for the teacher.** We do not recommend rote memorization of these definitions. The exercises provided in the activity cards should help the students understand these terms on an experiential level. Remember, DEFINITIONS DEVELOPED WITHOUT AN EXPERIENCE BASE ARE MEANINGLESS TO CHILDREN.

As your class proceeds through this unit, we suggest that you help the students develop definitions for the terms—in their own words. Each student should be able to recognize the terms in written form by the end of the unit.

1. BIODEGRADABLE—material capable of decomposing naturally, by biological processes
2. COMPACTOR—equipment used to crush trash into a small size
3. COMPOST—a mixture of soil and decayed plant and animal matter used as a fertilizer
4. DECOMPOSE—to break down to basic elements; to rot
5. DISPOSE OF—get rid of an unwanted item
6. DUMPSTER—a waste container used for storing large amounts of solid waste
7. ENERGY RECOVERY—incinerating waste in such a way that the heat from burning can be used to make steam for heating, cooling and/or to make electricity
8. GROUNDWATER—water within the earth that supplies wells and springs
9. INCINERATE—reduce by burning the amount of waste to be disposed of
10. LEACHATE—liquid which has drained through something (such as rainwater through solid waste in a landfill)
11. LITTER—man-made (or man-used) solid waste that is disposed of in the wrong place or allowed to escape from a container
12. ORGANIC WASTE—once living material, or products of a living thing (egg shells, coffee grounds, leaves, grass clippings, food scraps, hair, etc.)
13. RECYCLING—using materials recovered from solid waste to make new things
14. RESIDUE—what is left after waste has been incinerated, or after all the recoverable resources have been removed
15. RESOURCE—something that can be used to make something else (wood into paper, iron ore into steel, bauxite into aluminum, sand into glass, old cans into new cans, old bottles into new ones, old newspapers into cardboard); or a source of supply
16. RESOURCE RECOVERY—taking usable materials (resources) out of solid waste
17. SANITARY LANDFILL—a large outdoor area for waste disposal where discarded materials are usually compacted and then covered with a layer of earth; a place to bury solid waste
18. SIMULATION—pretense; a dramatization of an imaginary situation

19. SOLID WASTE—all useless, unwanted, or discarded materials (refuse, trash, garbage, debris)
20. SOLID WASTE MANAGEMENT—everything that has to be done to get rid of all the waste that is produced in the community (including collecting it, transporting it, and finally, processing it in one way or another)
21. WASTE PROCESSING—doing something to discarded materials so they can be handled more easily, or so resources can be recovered from them

REFERENCES

1. Divisions of Elementary, Secondary, and Vocational Education, Virginia Department of Education. Environmental Education Guide K-12. Richmond: n.p., 1974.
2. Essence, Indianapolis: Addison-Wesley Publishing Company, 1971.
3. USMES. How to Make an Opinion Survey. Durham, North Carolina: Moore Publishing Company, 1978.
4. Division of Litter Control, Department of Conservation and Economic Development. Litter Control Project Guide for Elementary School Teachers. Richmond: Spencer's Printing, 1978.
5. Division of Science and Elementary Administration, Virginia Department of Education. Program Goals and Objectives for Elementary Science. Richmond: n.p., 1978.
6. Keep American Beautiful. Waste in Place. New York: n.p., 1979.

WORKSHEET—EXTRA CREDIT ANSWERS

1. construction sites
2. motorists
3. business trash
4. loading areas
5. uncovered trucks
6. pedestrians
7. household trash

LEVEL SIX FILMSTRIP

Community Solutions for Solid Waste Pollution (Length: 5:12)

	Narration	Visuals
1.	(Title Slide)	
2.	(Credit Slide)	
3.	(Music Continues)	Man Littering on Sidewalk
4.	Boy: "Excuse me, Sir, but I noticed that you dropped your piece of paper. Don't you think it would be a good idea to put it in the trash can?"	Boy Pointing
5.	Man: "But what difference does one little piece of paper make?"	Close-up of Man
6.	Boy: "One piece doesn't make much difference, but think what 10 pieces would be like . . .	10 Pieces of Litter on Sidewalk
7.	. . . or 100 pieces . . .	100 Pieces of Litter on Sidewalk
8.	. . . how about 1000 pieces of paper?"	1000 Pieces of Litter on Sidewalk
9.	Narrator: Even if it appears that one piece of trash doesn't make a difference, when many accumulate, we then have a big litter problem.	Boy Adding One Piece of Trash to Pile
10.	Many communities in Virginia have started campaigns to fight litter and other trash disposal problems.	Dump Truck

11. Trash disposal is a very important issue for people who run local governments, because it costs a lot of money to dispose of solid waste. In the United States today, each person creates about one ton of trash each year. (*)	Green Boxes
12. Solid waste management is everything that has to be done to get rid of all the waste produced in a community. This includes collecting it, moving it, and finally processing it in one way or another.	Solid Waste Cycle
13. One way to help manage solid wastes is to recycle some of them. Recycling means using materials in solid waste to make new things.	Paper Recycling Center
14. Cardboard and other products can be made from old newspapers. Beverage cans, lawn furniture and other things are constructed from recycled aluminum cans.	Paper Recycling
15. Some communities use incinerators to burn part of their trash. This reduces the amount of solid waste which must go to a landfill.	Incinerator
16. When wastes are incinerated, heat energy is produced. This energy can be used to make steam for producing electricity. The electricity can be used to heat or cool buildings, or for lights, or to run machines. (*)	Incineration Process
17. However, many communities do not yet have recycling centers or waste incinerators and the trash must go to a sanitary landfill.	Landfill Equipment

18. A sanitary landfill is a large outdoor area for solid waste disposal where discarded materials are crushed each day before being covered with a layer of earth.

Landfill Equipment

19. Although landfills are a great improvement over open dumps, several problems can arise. If the dirt is not thickly applied, some trash can blow away and become litter.

Litter

20. If water drains through a landfill, some dangerous substances can be dissolved in the water.

Water at Landfill

21. If this polluted water drains into a river, the river, too, may become polluted. The site for a sanitary landfill must be carefully chosen to avoid water pollution.

Polluted Water

22. It is often difficult to find space for a landfill. People usually do not want to live near one.

City Scene

23. Some communities plan and manage landfills very carefully and even find new uses for them when they are filled up. Mt. Trashmore in Virginia Beach is a city park built on a closed landfill.

Mt. Trashmore

24. People can participate in many recreational activities at Mt. Trashmore.

Lake at Mt. Trashmore

25. Someday this landfill could be another Mt. Trashmore. Do you think a landfill in your community could become a park someday? (*)

Landfill

26. Since every person creates trash, proper solid waste management in a community is an issue that should involve everyone.

Crowd of People

27. First of all, communities need good litter prevention and solid waste management laws.	Highway Anti-Littering Sign
28. Everyone in the community should know what their laws are and what the fines are for breaking the laws. (*)	Returnable Beverage Bottle
29. All students should study their state and community littering laws.	Virginia Anti-Litter Laws Booklet
30. All members of a community need to get involved in making decisions about solid waste management. They must study their litter and other trash disposal problems, and the possibilities of recycling in their community.	Community Committee Meeting
31. Decision making in a community involves many different people looking at the problems and finding solutions to these problems.	Community Meeting
32. Whatever the decisions reached, all members of a community, young and old alike, must take pride in their city, town, or county.	Children in School Yard
33. It's up to all of us to build a better tomorrow. Won't you do your part?	Pedestrian Littering With Boy Watching
34. (Credit Slide)	
35. (Credit Slide)	

NOTE: Asterisks (*) indicate spots where you may wish to stop the cassette for discussion.

JUNIOR ECOLOGY CLUB ORDER FORM

My students have completed the Level ____ unit of OPERATION WASTE WATCH. Please enroll my class in the JUNIOR ECOLOGY CLUB PROGRAM and send me _____ membership certificates.

☐ I plan to use the certificates to reward my students for completing the OPERATION WASTE WATCH unit.

☐ I plan to involve my class in conservation/environmental projects. Please send a list of suggested activities.

* * * * * * * * * * * * *

Overall, I would evaluate this OPERATION WASTE WATCH unit as:

1 2 3 4 5
poor excellent

In terms of reaching the unit objectives, on the average my students did:

1 2 3 4 5
poorly an excellent job

I would rank my students' interest level in the unit as:

1 2 3 4 5
not interested very interested

I would rank my interest in teaching this unit again as:

1 2 3 4 5
not interested very interested

COMMENTS: _____

_____

_____

* * * * * * * * * * * * *

Please send the Junior Ecology Club Membership Certificates to:

Name: _____

Position: _____

School: _____

Address: _____

Phone: _____

School Division: _____

ACKNOWLEDGEMENTS

Through the diligence and creativity of numerous individuals, the Division of Litter Control has produced a unique instructional program for the teachers and, most importantly, for the children of Virginia. Our wholehearted appreciation is extended to each individual and firm which helped make OPERATION WASTE WATCH a reality.

Our thanks go first to Drs. Edwin White and William Brown who wrote the original draft and developed our activity card format, and to Keep America Beautiful for allowing us to base OPERATION WASTE WATCH on their program, WASTE IN PLACE.

Lawler Ballard Advertising of Richmond and Norfolk produced the comic and coloring books, the posters, and all of the art work of the kits. We feel the art alone will heighten the "litter awareness" of many students and teachers. We wish to thank especially the creative and production department of Lawler Ballard Advertising for their contributions. Jon Peterson and Saul Wrenn of the Film Production Service, State Department of Education, produced our colorful filmstrips.

Several professional educators contributed their talents in evaluating the project. Teresa Auldridge and Michael Bentley of the State Department of Education provided expert critiques. Drs. Allen Turnbull, John Nezlek, and Joseph Galano of Williamsburg conducted the formal analysis of our field-testing. Dr. Richard Mercer of Richmond edited the pilot manuscript.

We also wish to thank Outdoor Biology Instructional Strategies, (OBIS), of the University of California for permission to use the Recycling Game in the Level 5 Unit. And we thank the Phoenix Quarterly for granting permission to use two articles in the Level 5 Unit.

My personal thanks go to several fellow members of the Division of Litter Control staff who contributed many hours and their "litter expertise" to the effort: Ginger Raymond who assisted in all aspects of production; Janet Wynne, Crystal Belt, and Mollie Osborne who typed the manuscript; and our Commissioner, Robert W. Slocum, who made it all possible.

Finally, we wish to recognize and thank all those individuals who participated in the field testing of OPERATION WASTE WATCH: the local coordinators, principals, and above all, the

LEVEL 6
TEACHER CARD
OPERATION WASTE WATCH
VIRGINIA DIVISION OF LITTER CONTROL

Community Solutions for Solid Waste Pollution Individual Activity Cards

Introduce the INDIVIDUAL ACTIVITY CARDS (IACs) after all the students have seen the filmstrip. The 17 IACs are designed for small groups or individual students. However, the IACs may be used as total class activities if it is not feasible to carry out individual or small group activities with your class.

The majority of the Level 6 IACs need not be completed in numbered sequence (with the exception of IACs 13-17). There are several ways to use the IACs:

1. **One group of students could work with you** on a few cards while an aide or other adult uses some other cards with another group.
2. Three or four IACs could be placed at one time in a **Learning Center.** Allow individuals to work on the cards.
3. Allow small groups of students to choose one activity card and then **make a group report** to the class about the activity selected. You may wish to duplicate additional sets of cards so that several students can work on the same card simultaneously.
4. If a cassette player is available, you may decide to **put the IACs on audiotape.**

Each student should complete the IACs before the CLASS ACTIVITY CARDS (CACs) are introduced. (However, the MINI-LANDFILL Activity (IACs 13-17) will overlap the CAC activity.)

Cards containing more difficult activities are marked with asterisks (*) in the upper right-hand corners.

To shorten the unit somewhat, we suggest that only the CORE ACTIVITY CARDS be used. Core Cards are labeled CORE in the upper left-hand corners.

Duplicate the VOCABULARY WORKSHEET for each student for IAC-12.

IDEA AND OBJECTIVE NOTATIONS REFER TO NUMBERED IDEAS AND UNIT OBJECTIVES ON PAGES 1 AND 2 OF THE TEACHER GUIDE.

Note: Contact the Division of Litter Control for the name of the Litter Control Program Coordinator in your community. This individual will be able to inform your class about solid waste disposal and laws in your locality. For IAC-8 you will need to prepare a short list of local anti-littering laws in simple language to distribute to the students.

Throw Away

Make a list of the amount and kinds of solid materials you dispose of (throw away) during a certain period of time, such as one day or one week. Examples of solid waste most people dispose of are food wrappers, cardboard boxes, cans, bottles, waste paper, food remains, and used school supplies.

Give your paper to your teacher.

Note to the teacher: You can extend this activity into a game. Ask a few students to read the lists of other students to the class without identifying the authors. Ask the class to try to guess something about the writer of the list (for example—is the writer a boy or girl? What does the author enjoy doing?, etc.).

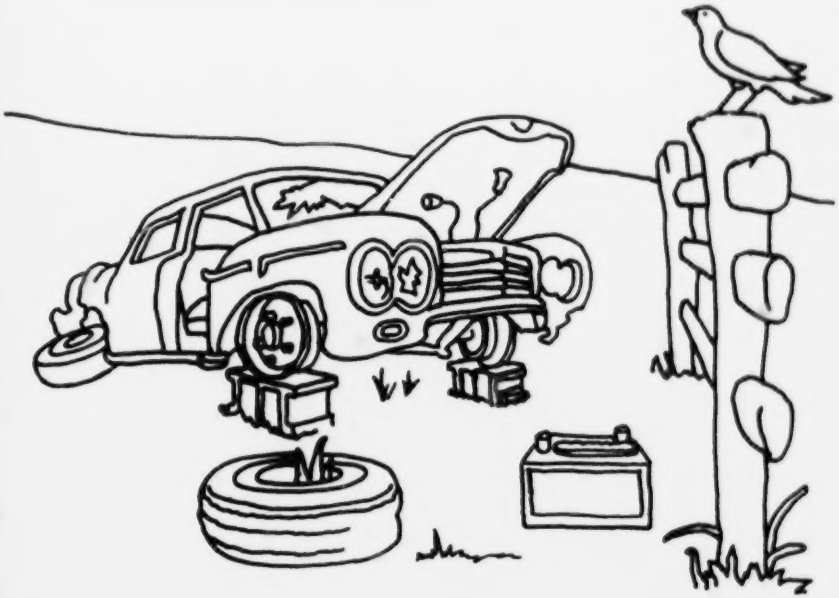
A Waste Survey

Look around the community near the school for **solid wastes:**

Look for trash in garbage cans, "junk" automobiles, rubble from demolished buildings, food remains, piles of leaves, lawn clippings, unused building materials, tires, discarded home appliances such as refrigerators, and litter such as beverage cans, plastic, and paper. Make a list of all the **solid waste** you find.

Are there some places in the community where there is more solid waste than in other places? Write down the name of the place where there is the **least** amount of solid waste. Write down the name of the place where you found the **most** solid waste.

Give your paper to your teacher.



Cafeteria Count

Write down the names and numbers of items which your class throws away in the school cafeteria in one lunch period (for example: 25 milk cartons, 5 sandwich bags, 30 paper napkins, 2 apple cores, etc.).

Think about how many of each item the whole school probably throws away **in one day.** Make a list of what you would guess these amounts are (for example, 375 milk cartons, 75 sandwich bags, etc.).

Where is all this trash taken? Could any of the items thrown away be recycled or reused?

Give your lists and the answers to these questions to your teacher.

Community Interview

Ask one of your parents and two adult neighbors these questions and write down their answers:

1. Do you think solid wastes are disposed of properly in our community?
2. Would you like to see anything changed about the way solid wastes are handled?
3. What could the local government do to help solve solid waste problems?
4. Do you know what the laws are in our community about disposing of trash and keeping property clean?
5. Would you like to start recycling the glass, aluminum and paper you use?

Read the answers to your class and give your paper to your teacher.

Patterns

Here are some things which could happen to the solid wastes in and around a house:

1. **purchases**
2. **solid wastes in the house**
3. **metal, newspaper, paper, glass, plastic** **food remains**
4. **litter** **garbage pail** **sink garbage disposal**
5. **trash container** **garbage truck** **recycling plant**
6. **landfill** **compost pile** **garden**
7. **community sewer system** **river**

Copy this chart. Underline in **red** the things that **do** happen to your family's trash. Underline in **green** the things you think your family **should** do at home. Discuss your ideas with your family and show them your chart.

Turn in your chart to your teacher.

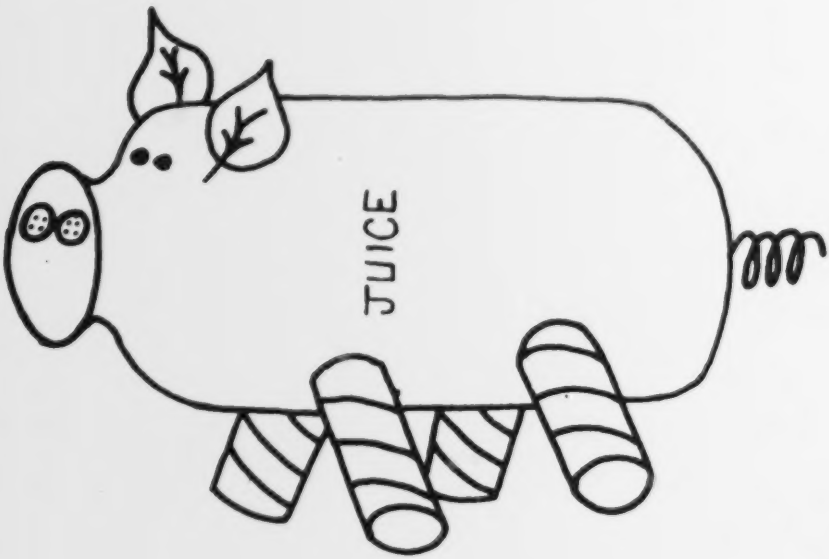
An Art Project

Bring some **clean** solid waste to school from a trash can at home or from litter found in the environment.

Create some art from the solid wastes you collected. (Make a sculpture, collage, painting, or other form of art.)

Now write a poem or a short story about your art.

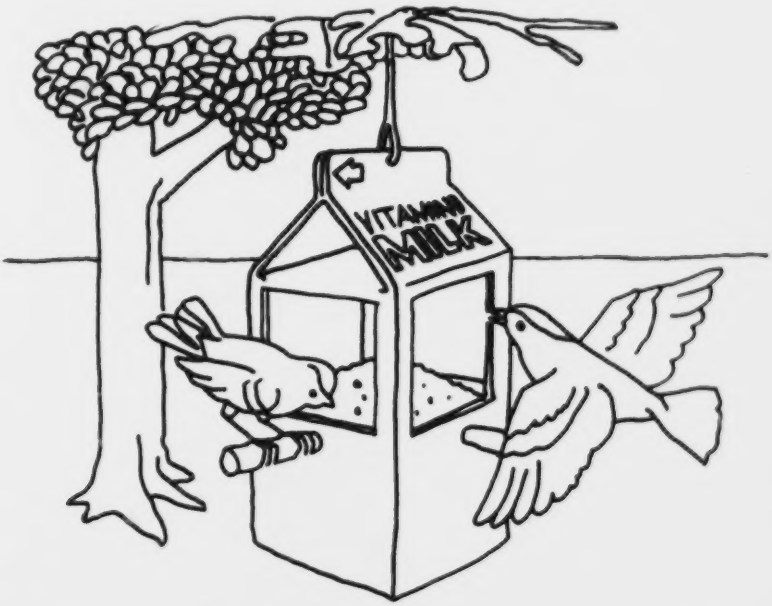
Display your art and your creative writing in the classroom.



Be An Inventor!

Find at least 6 objects in your home or yard which are useless, unwanted or discarded materials (solid waste). Find a new use for each object or for combinations of the objects.

Show your invention to your classmates.



Ranger Rick's Nature Magazine has two reprints available free of charge called "Recycling," and "Recycle for the Birds," which have many creative and helpful ideas. Write to:

National Wildlife Federation
1412 16th Street N.W.
Washington, D.C. 20036

Laws

From your teacher, get a copy of the litter and solid waste management laws for your community.

Read these laws carefully. Make a list of everything a home owner must do to dispose of trash properly. Make a list of the responsibilities of every apartment dweller.

Do you think the laws need to be changed in any way? Do you think the community needs any new laws? Write down your answers to these questions and give your paper to your teacher.

(**Note to the teacher:** Contact the Division of Litter Control for information on state laws and local leaders who administer the litter control program in your community.)

What's Going on in Your Community?

Find out how trash was disposed of in your community 50 years ago, 20 years ago, 10 years ago.

Find out how trash is disposed of today in your community. Do you have a home trash collection service? Do you use your county's green box system? Is the waste taken to a landfill, burned (incinerated), recycled or more than one of these? Find out where landfills, incinerators or recycling centers are in your community. On a map of your area, mark each location.

You can write a letter to the local SANITATION DEPARTMENT to get this information. Ask your teacher to help you with this project.

What improvements would you make in your community's solid waste management system?

Write a short report on solid waste management in your community.

Give your written report to your teacher.

T.V. Commercial

Write a three-minute (one page) commercial dealing with the solid waste management system in your community. The commercial may be serious or funny. Think about the age of the people who are to see your commercial.

Present the commercial to your class. Perhaps it can be videotaped for others to see.

How Do You Feel?

Answer the following questions on your paper:

Do you think all solid waste is ugly, or are some things in solid waste pretty?

Is it important for an outdoor environment to look beautiful? Why or why not?

Is it important to keep the indoor environment attractive? Why or why not?

Write a short story about how you feel when you are in a beautiful outdoor environment and how you feel in an ugly outdoor environment.

Give your answers and your story to your teacher.

Vocabulary Worksheet

Get a copy of the VOCABULARY WORKSHEET from your teacher. Complete it on your own; then give it to your teacher.

A Mini-Landfill

You will need two identical pieces of each of the following materials:

Food scraps, newspaper, cardboard, cloth, soap chips, paper, glass, aluminum and steel cans, plastics, copper wire

1 cardboard shoe box
1 piece of aluminum foil or plastic, large enough to line the shoe box
Toothpicks
Several pieces of string, cut each about 6 inches long
Masking tape
Several small pieces of cardboard
½ glass of water
Soil to fill shoebox ⅔ full

Now you are ready to build a small landfill. First, line a shoe box with aluminum foil or plastic.

Put the soil in the shoe box. (Don't use **potting soil,** because it does not contain the tiny creatures (organisms) which break down natural waste.)

With tape, attach a piece of string to each toothpick. Tape the toothpicks to your waste objects. Write the name of each waste object on a small piece of cardboard. Fasten each piece of cardboard to the second end of the string with masking tape. Bury two identical rows of waste materials in the soil, leaving the cardboard labels on top of the soil surface. Write down the date you buried the waste items.

Go on to IAC-14/17

Add a little water. Put your mini-landfill in the sunlight, perhaps on a windowsill. Wait about 10 days before you continue. Write down the date you examine the items.

Carefully remove the waste items from **one row** of your landfill. Examine the items with a magnifying glass.

Go on to IAC-15/17

OPERATION WASTE WATCH **IAC-15/17**
LEVEL 6

CORE

Answer the following questions on your paper:

1. Which items in the mini-landfill have decomposed the most?
2. Are the items which are decomposing **man-made or natural?**
3. Are the decomposing items **biodegradable?**
4. Which items have just started to decompose? Why do you suppose they are decomposing more slowly than the first group?
5. Which items show no signs of decomposing? Can you tell why? Will they remain unchanged forever? Are they made of materials which should be reused or recycled instead of being buried in landfills?

Go onto IAC-16/17

CORE

6. Why might mold form on your mini-landfill? What would happen if the mini-landfill had been made of sand and no water had been added? What happens to waste left out on a desert?
7. Suppose the landfill wastes had been put in potting soil. Would the biodegradable wastes have decomposed as quickly? Why or why not?
8. Did you notice any space around some of the waste items as you dug them out? What do you think caused that space to form? If this happens in a full-sized landfill, might this affect how the land can be used after the landfill is filled with trash?
9. If you let water drip through your landfill, would the water get dirty?

Give your paper to your teacher.

(Note: Write to Mt. Trashmore Park, 300 Edwin Drive, Virginia Beach, VA., to find out about Mt. Trashmore, shown in the Level 6 filmstrip.)

Go on to IAC-17/17

CORE

Incineration

Materials You Will Need: 1 pair of tongs
1 candle in a holder
matches

With your teacher supervising, take each item that showed **no** signs of decomposing in your mini-landfill and hold it over a candle flame with tongs. Burning is also called "INCINERATION". Some communities get rid of solid wastes by incinerating them in very large, very hot furnaces called **incinerators.**
CAUTION: DO NOT BURN PLASTICS. SOME PLASTICS GIVE OFF VERY TOXIC FUMES WHEN THEY ARE BURNED.

1. Which items burn; which do not?
2. Of the ones that burn, which ones give off smoke?
3. Which of the ones that give off smoke, or an odor, would probably cause air pollution? Why? (You may contact the Virginia Air Pollution Control Board for information.)
4. Of the items which do not burn, which ones do you think would burn if the heat were as high as that used in a municipal incinerator? How could you find out the answer to this question? If some materials such as glass and copper won't burn, will they **melt** when the heat gets high enough? Why might we want to melt some items?
5. Do you think it costs a lot of money to build and repair a waste disposal incinerator?
6. What does a community do with wastes which cannot be burned?

* * *

Carefully remove the items in the **second** row of your landfill after **20 days.** Repeat the observations and questions on IACs 14, 15, and 16.

Based on what you have learned about **sanitary landfills** and about **incineration,** do you think your community needs an incinerator and a sanitary landfill? Why or why not?

LEVEL 6
TEACHER CARD
OPERATION WASTE WATCH
VIRGINIA DIVISION OF LITTER CONTROL

Community Solutions for Solid Waste Pollution Class Activity Cards

The 12 CLASS ACTIVITY CARDS (CACs) are designed for you to use with a large group of students or the whole class. These cards present a simulation game designed to develop the students' decision-making skills and their understanding of community solid waste management problems. The CACs should be used after the students have seen the filmstrip and completed the IACs.

Notice that the 12 cards should be followed in numerical sequence. Before you begin the simulation game, distribute a copy of the Glen City Information Sheet and Map to each student. Duplicating masters are provided in this kit. The class will be divided into 4 committees and will conduct independent research. (This activity is from the Sixth Grade Study Unit of **WASTE IN PLACE,** Keep America Beautiful's curriculum for elementary students.)

IDEA AND OBJECTIVE NOTATIONS REFER TO NUMBERED IDEAS AND UNIT OBJECTIVES ON PAGES 1 AND 2 OF THE TEACHER GUIDE.

Be sure to find out what your community is doing to fight the littering problem. Contact the Division of Litter Control or your local government for information. Explain the local program to your students.

DUPLICATING MASTERS NEEDED FOR THIS ACTIVITY (see box lid packet):

1. Glen City Information Sheet
2. Map of Glen City
3. Legal Committee Responsibilities
4. Equipment Committee Responsibilities
5. Disposal Methods Committee Responsibilities
6. Temporary Landfill Siting Committee Responsibilities (2 pages)

Solid Waste in Our Community

Discuss the following questions with the students:

1. When we talk about "waste management" what do we mean? (Everything that has to be done to get rid of all the waste in a community.)
2. Who can tell me where solid waste is generated—where many things are used and have to be discarded—here in school? (classroom, cafeteria, etc.) Who can tell me where most solid waste is generated in our homes? In our neighborhoods?
3. Let's think about the solid waste in our homes. What steps do we have to take to get rid of it? How do we manage it? (Empty all household containers into large, weatherproof containers, etc.).
4. Once it is outside our houses, does anyone know what happens? Can anyone tell us, step-by-step, where it goes and how it gets there? (Pickup by sanitation workers in collection vehicles; transported to transfer station, or directly to disposal site; or taken to dumpster or landfill by property owner.) Does our community use sanitary landfills? How many? Do we have any recycling centers?
5. How many people do you think it takes, including the people in your house, to get rid of your family's solid waste?

Go on to CAC-2/12

6. Can anyone tell us what kind of equipment is used to get rid of your family's solid waste? What do the sanitation workers use to pick it up? What is it carried in?
7. Does anyone know how we dispose of solid waste in our community? Does our community use sanitary landfills? incinerators? recycling centers? How many of each are there?
8. Does anyone know of any other methods for disposing of solid waste—ways to get rid of it without hurting the environment?
9. What would happen to our city (county or town) if we didn't "manage" solid waste—if we just threw it in the street or road the way people did hundreds of years ago? What would our community look like? What would our community smell like? What would happen to our health if all our solid waste, all the trash and garbage and debris from every house and business, was just thrown out?
10. Now, can anyone tell me why it is very important to manage solid waste properly? For the next few weeks, we are going to find out how waste is managed in our community, and what other ways there are for decreasing the amount of it, collecting it, and disposing of it in a way that won't hurt people or the environment. To help us learn, we are going to play a simulation game. Can anyone tell me what kind of game that is? (Continue discussion and introduce concept of "pretending".)

Go on to CAC-3/12

For the next few weeks we are going to pretend that we live in Glen City. The Information Sheet I just handed out tells you about Glen City. The map shows you what it looks like. (Read over the Information Sheet with the students and help them study the map of Glen City.)

We are going to pretend that Glen City needs a new way to manage solid waste. The citizens here have been using a sanitary landfill, but there is only a little room left in that landfill. A new landfill, or a new way of getting rid of Glen City's waste, will be needed pretty soon. We also need to keep our city cleaner. We need to keep waste from escaping from containers and becoming litter, and we need to stop people from littering. And we want to save money.

We are going to pretend that this class has been asked to decide just what should be done. Some of us will pretend to be **Research Committee members**—people who have to get all the information about the various parts of waste management and make suggestions to the City Council about what Glen City should do with its waste. A few of us will pretend to be **City Council members**—the people who must decide what is the best way to handle our waste management problems. Council members will listen to what the Research Committees suggest, and then decide what is going to be done.

Go on to CAC-4/12

The 4 Research Committees are:

A. **The Legal Committee**—Its job is to find out what rules Glen City has about solid waste management. These rules should help people have good habits about handling waste. If they don't, maybe Glen City needs some new laws.

B. **The Equipment Committee**—Its job is to find out what kinds of containers and equipment Glen City needs to make sure that no solid waste escapes while it is being stored, collected, or taken to where it will be disposed of.

C. **The Disposal Methods Committee**—Its job is to find out what is good and what is not so good about the various methods available for getting rid of waste without hurting the environment.

D. **The Temporary Landfill Siting Committee**—We are pretending that there isn't enough time for Glen City to just go ahead and do something new. We will need a place to dispose of solid waste for awhile, to give us time to build a permanent place. This committee will suggest a place and a design for the new temporary landfill.

Go on to CAC-5/12

If possible, let the students choose the committee on which they prefer to serve. Give each a copy of the responsibilities for that committee, using the duplicating master provided.

Make sure everyone understands what is expected of his or her committee.

Set a schedule for carrying out the various responsibilities for each committee.

Remind the class that while they are pretending to live in Glen City, they will be getting information about waste management in **their own community.** They are to pretend that the facts they learn about your community are true for Glen City, too.

Go on to CAC-6/12

Simulation Situation

Read the following summary to the students:

A farmer who owns 350 acres along the John River recently passed away. After completing an extensive survey, a private consultant for the city has recommended that the land be used as a solid waste processing site. Three systems are proposed, specifically—(1) a long-life (50-60 years) sanitary landfill, (2) an energy-generating incinerator, (3) a recycling center or a resource recovery system. Based on considerable public reaction to each of the systems proposed, City Council has now decided to conduct a series of public hearings to determine what method will be adopted. In the meantime, the Council has decided to create a **temporary** (3-5 years) **sanitary landfill** to handle wastes until the long-term system is functioning. $125,000 is available for new equipment to store, collect, and carry waste to the new temporary landfill site.

The city is very concerned with improving solid waste management. We also need to keep the city cleaner (that is, to keep waste from escaping from containers and uncovered trucks and becoming litter and to prevent people from littering). And we want to use a system that will save us money.

Go on to CAC-7/12

Committee Work

Each committee is to carry out the research it is responsible for.

Ask each committee to write down all the facts each worker learns and keep this information in a **Committee Notebook.**

Reports—Each committee must prepare **a written and oral report** about what it found out and about its recommendations. Each committee must decide which members will report orally and how to present the findings.

Go on to CAC-8/12

City Council Meeting

After all the committee work is completed, hold a City Council meeting.

1. Have each committee draw straws among its members to select one person to play the role of a "City Council Member".
2. Let the selected students choose the role they will play (or assign the roles yourself):
   A. **City Council President**—This person is the president of the bank. He wants to see Glen City grow but knows that it will not continue to grow if it isn't a clean, pleasant, environmentally-sound community.
   B. **Council Member Jones**—This person is worried about taxes. He or she wants a clean, pleasant, environmentally-sound city, but only if it won't cost any money.
   C. **Council Member Smith**—This person doesn't pay attention and never remembers what has been said. He or she keeps asking questions that have already been answered.
   D. **Council Member Green**—This person wants to be sure that whatever is decided is the best decision which could be made. He or she wants all the details, wants to know the disadvantages as well as the advantages, and will accept some disadvantages if they are not too bad.

Go on to CAC-9/12

3. Have the council members go up to the front of the room and sit in a row. **The City Council President says:** "This meeting will now come to order. We are going to hear recommendations from the four committees that have been studying Glen City's solid waste management needs. Council members will let each committee finish its presentation before asking any questions. The first committee to report will be the **Legal Committee.**"
4. Have the committee report in whatever manner they have agreed upon among themselves. When they have finished, encourage the "council members" to ask questions. Prompt them, if necessary.
5. Follow this procedure with each committee in turn.
6. When all the committees have completed their reports, allow the "council members" to ask more questions if they are so inclined. Allow committee members to ask questions of other committees.
7. When all the Council's questions have been answered, have them make individual lists of the recommendations they favor, but instruct them not to discuss their votes with the other members of the class.

Go on to CAC-10/12

8. Meet with the Council out of hearing from the rest of the class. Help them achieve concensus on the one plan they favor, but do not urge them to accept all the recommendations. Have the Council President write out the list of accepted recommendations to read to the rest of the class.
9. Have the Council President read the list of recommendations adopted by the Council. If some of the recommendations were not accepted, have other council members tell the class why.

Go on to CAC-11/12

10. Initiate a discussion on the Council's decision by asking the following questions:
    a. What are some of the things that you learned about solid waste management?
    b. How did you feel about the simulation?
    c. Did it help you to work better with your classmates?
    d. What did you learn about how your personal decisions affect the lives of other people?
    e. What did you learn about how you personally have to bend your opinion at certain times in order to work with other people, such as your fellow committee members?
    f. Did you like the Council's decision?
    g. Did you agree with the parts of your proposal that they accepted?
    h. Were you upset in any way about the parts of your proposal they didn't accept?
    i. Do you feel that the parts that were left out would have made Glen City's solid waste program better?
    j. Did you feel comfortable in making your presentation?
    k. Did you have enough background information to make a good presentation?

Continue this line of discussion as long as necessary, letting students comment and evaluate the effectiveness of this project.

Form an Ecology Club!

Review the information on forming an ECOLOGY CLUB which is provided in the Level 6 kit.

If the activity is appropriate for your students, present the idea of forming an ECOLOGY CLUB to study and deal with your community's waste and other environmental problems. The Division of Litter Control can provide ideas and free membership materials to any interested group of students, grades 6-12.

The Division also conducts an Annual Awards Program to recognize outstanding projects of the Ecology Clubs. Contact us for further information.

Ecology Club Information
Virginia Division of Litter Control
1215 Washington Building
Richmond, Virginia 23219

END

U.S. Dept. of Education

Office of Education
Research and
Improvement (OERI)

ERIC

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